Space Nutrition

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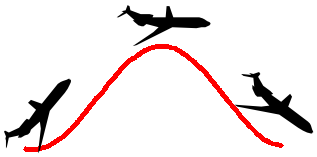
Artificial Gravity - Going for a Spin

Floating Fliers



Research on the effects of space flight often requires participation of human subjects. The Human Test Subject Facility (HTSF) provides test subjects for ground-based research. The HTSF also coordinates schedules for the KC-135. The KC-135 is a modified Boeing 707 aircraft, similar to the type that the military uses for cargo transport. The KC-135 flies in parabolas to produce episodes of weightlessness lasting 20 to 25 seconds, much like going over the big hill in a roller coaster ride several times. A KC-135 flight typically consists of 30 to 40 of these parabolas. By using simulated microgravity on the KC-135, scientists and test subjects can work in a weightless environment to test equipment and experiments before they are flown in space.

Curiosity Corner

Alex from Cleveland, OH asks, "How does zero gravity affect digestion and swallowing food?"

Your body has no difficulty swallowing or digesting food in zero gravity. Although some studies suggest that the amount of time food stays in the gut may be increased during space flight, eating in space is very similar to what occurs on the Earth. In fact, floating food is actually a bigger challenge for astronauts - you can't just put your "plate" down, because it might just float off!

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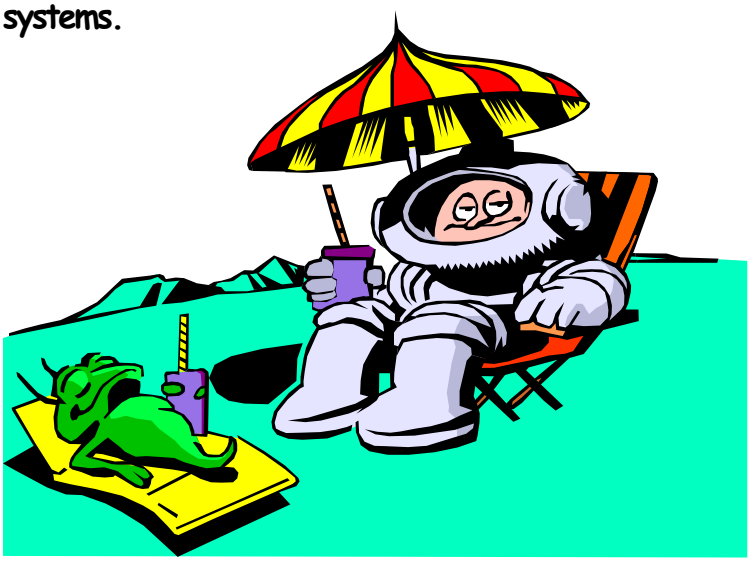
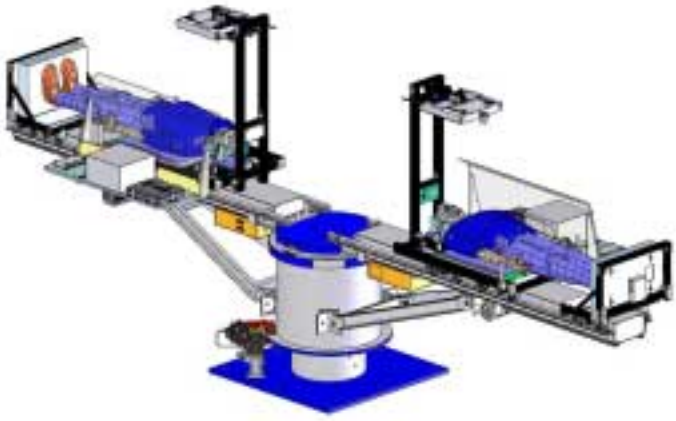
All experiments are tested on the ground before being done during space flight. We use what are called "ground-based analogs" of space flight. These are methods that simulate or mimic one or more effects of weightlessness. We can use these analogs to figure out how to design countermeasures to protect against the negative effects of weightlessness on the human body. We've used underwater analogs and bed rest models to study these effects. During bed rest, many of the physiological changes that occur in bone, muscle, and the cardiovascular system are similar to those that occur during space flight. In one exciting study that will begin this fall, we will test the effectiveness of artificial gravity as a countermeasure to prevent or minimize bone and muscle loss, and also help protect other body systems.

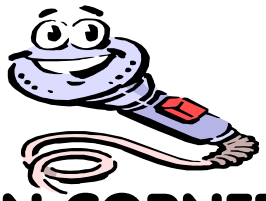


We will be able to use information from this experiment to help design better crew exploration vehicles and future space stations. If we find that artificial gravity effectively prevents muscle or bone loss associated with space travel, then future spacecraft could be designed to rotate or could even have centrifuges within the spacecraft! It might turn out that if we can't do without gravity - we just need to make some!

Did you know?

- The US astronaut currently aboard the International Space Station (ISS) is Mike Fincke. He will live and work on the ISS with Russian cosmonaut Gennady Padalka. Together they are the 9th crew to fly on the ISS.
- Portions of the movie *Apollo 13* were filmed on board the KC-135, allowing the actors to demonstrate the sensation of weightlessness for the movie's audience.
- What is artificial gravity? Although the term itself implies that we will be using artificial or fake gravity, it is actually not gravity at all! Instead of using gravitational pull, artificial gravity uses centrifugal force. This is the same force that keeps water in a swinging bucket.
- You may be thinking, How exactly will we exert artificial gravity on bed rest subjects? For various lengths of time, subjects will lie in beds that are attached to a rotating centrifuge.



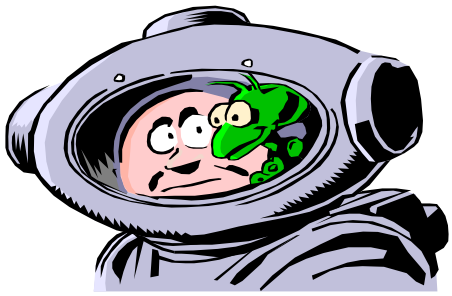


FUN CORNER

Can you find these words?

Gravity	Nutrition	Blood
Bed rest	Artificial	Analog
Training	Parabola	Research

A	T	G	C	L	N	I	A	L	Q
G	H	D	O	O	L	B	P	A	N
S	R	C	M	T	E	A	T	I	U
G	D	A	R	R	R	O	S	C	T
O	J	I	V	A	W	P	E	I	R
L	E	U	B	I	E	D	R	F	I
A	O	O	L	N	T	S	D	I	T
N	L	R	T	I	T	Y	E	T	I
A	S	R	S	N	E	P	B	R	O
S	R	I	E	G	L	O	R	A	N



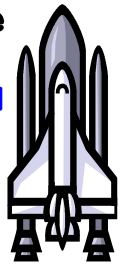
Word of the Month

Respite

The Space Nutrition Newsletter will take a brief respite, or break, until August 2004.
Have a wonderful Summer!

Check out these cool NASA links for more fun space science facts!

http://www.nasa.gov/audience/forkids/index.html
http://jsc-aircraft-ops.jsc.nasa.gov
http://edspace.nasa.gov/index.html
http://www.spaceflight.nasa.gov
http://zerog.jsc.nasa.gov



Check out the Nutritional Biochemistry Laboratory's website for more information about nutrition and space.

http://haco.jsc.nasa.gov/biomedical/nutrition/